ORDOVICIAN GRAPTOLITES FROM A NEW LOCALITY NEAR JUTLAND, NEW JERSEY

By

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Abstract

The Union Township Courthouse locality, recently discovered in the Jutland Klippe, yields graptolites of the *Nemagraptus gracilis* Zone.

Introduction

The geology in the vicinity of Union and Clinton Townships, Hunterdon County, New Jersey, has been studied for many years. The work of Weller (1903), in which the structural complexity of the area was noted, also revealed the existence of Ordovician graptolites in the fine-grained clastic rocks near Jutland. Weller's collections were reviewed by Ruedemann (1947). Numerous studies and collections followed, among which was the comprehensive review by Perissoratis *et al.* (1979). Graptolites and conodonts were cited from approximately fifteen localities and include both Early and Middle Ordovician species. We describe here yet another locality discovered since the review by Perissoratis *et al.* (1979), with a fauna of considerable size and diversity. It adds another point of evidence from which to decipher the geologic history of the Jutland area.

This locality was discovered during reconnaissance work for a 1984 survey on behalf of the National Park Service, Delaware Water Gap National Recreation Area (Parris & Cruikshank, 1984). Although outside the geographic area of the study, it provided an interesting comparison to graptolite faunas elsewhere in the region. The abundance and diversity of the species justifies the placing of the material on record as one of the best faunas collected from the Jutland-Clinton area.

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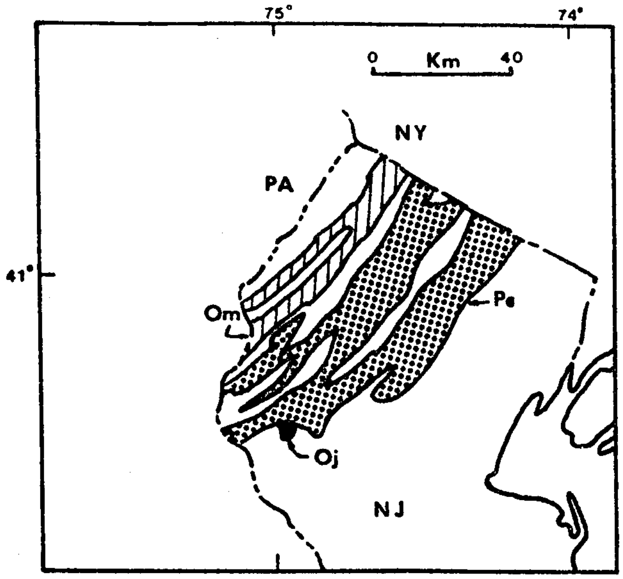

Figure 1. Map showing the location of the Jutland klippe with respect to the Reading prong and the main outcrop belt of the Martinsburg Formation.

Om	Martinsburg Formation
Oj	Jutland klippe
PC–	Reading prong

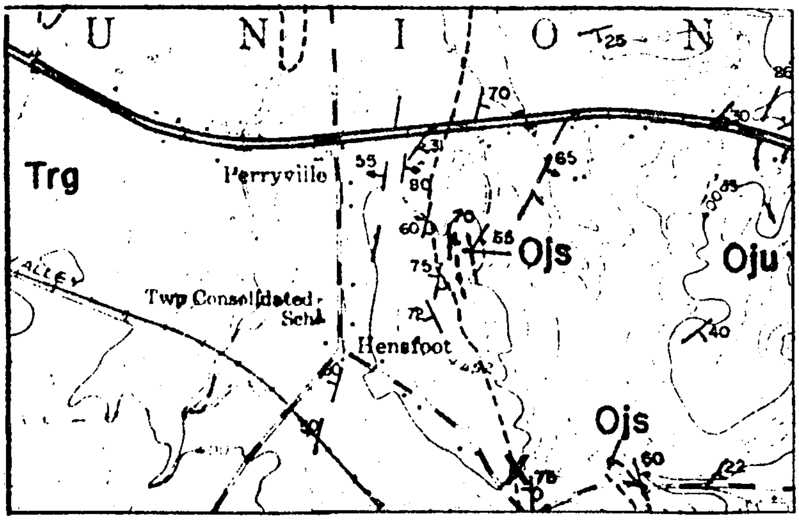

Figure 2. Reproduction of a portion of the High Bridge quadrangle as mapped by Markewicz (unpublished) with Union Township Municipal Building locality indicated (X). Units used by Markewicz were then considered to be the Martinsburg Formation, there designated the Jutland member of the Martinsburg Formation. Other studies in the vicinity of Jutland suggest that the term Martinsburg Formation should not be applied to rocks of the Jutland area. We advocate the designation of local lithic terms for the sequence, but do not propose any new terms.

Oju	Jutland member
Ojs	Jutland member, sandstone and conglomerate facies
Trg	Triassic conglomerate

The locality is on the contact between Ordovician and Triassic rocks as mapped by Markewicz.

Locality and Lithology

The Ordovician shales and siltstones of the Jutland area are bounded to the north and west by the Precambrian rocks of the Reading prong and the Cambro-Ordovician Kittatinny Group and possibly the Jacksonburg Formation. The Triassic Newark Supergroup lies to the south of the area.

The Jutland shales were originally thought to be an outlier of the Martinsburg Formation, which forms an extensive outcrop belt to the north (see Figure 1). However, the graptolite and conodont faunas suggest that the rocks of the Jutland area are older than the Martinsburg Formation, and of similar age to the Jacksonburg Formation (Perissoratis *et al.*, 1979). The rocks of the Jutland area are now believed to be one of the Taconic klippes that were deposited during an early phase of the Martinsburg basin, and displaced during the Ordovician Taconic orogeny.

The outcrop is located behind (east side) of the Union Township Municipal Building, which is on Perryville Road just north of its intersection with Race Street (Figure 2).

The graptolites are preserved as carbonized impressions in gray shale. The lithic unit correlates to Unit B of Perissoratis *et al.* (1979). It was designated the Jutland Member of the Martinsburg Formation (Markewicz, open file).

Biostratigraphy

A sample of approximately one hundred specimens recognizable as Graptolithina was collected. Specimens identifiable to genus or better are listed in Table 1; a complete list of specimens is available on request. Graptolite rhabdosomes of scandent biserial type accounted for about 40 percent of the fauna. The Ordovician graptolite zones for North America are shown in Figure 3. It should be noted that the graptolite zones for North America are still being revised (*e.g.*, Finney, 1982).

The fauna fits the description of the *Nemagraptus gracilis* Zone (Zone 11 of Berry, 1960), believed to be the equivalent of the lower part of the *N. gracilis* zone of Riva (1972, 1974). Reasons for this correlation are the common occurrences of *Dicellograptus* and *Dicranograptus* (small stipes) concurrently with rare *Didymograptus.* Scandent biserial forms are common, but *Climacograptus bicornis* and large diplograptids have not been found. The name giver of this zone, *Nemagraptus gracilis* also has not been found.

A comparison to Ordovician graptolite zones described by Finney (1982) indicated that this fauna falls within the range beginning with uppermost *Glyptograptus* cf. *G. teretiusculus* Zone (Zone 10 of Berry, 1960) and the uppermost *Climacograptus bicornis* Zone (Zone 12 of Berry, 1960). However, the fauna as a whole matches the original description of Zone 11 (Berry, 1960) and we are confident that our correlation is valid. Further evidence of the correlation is the presence of *Glossograptus ciliatus*, considered by Riva (1972) to be characteristic of the *Nemagraptus grcilis* Zone.

A fauna which correlates to the *Nemagraptus gracilis* Zone (Zone 11 of Berry, 1960) is comparable to other known graptolite localities in the Jutland area. The site falls within the outcrop area of Unit B of Perissoratis *et al.* (1979) and is consistent with that previous work.

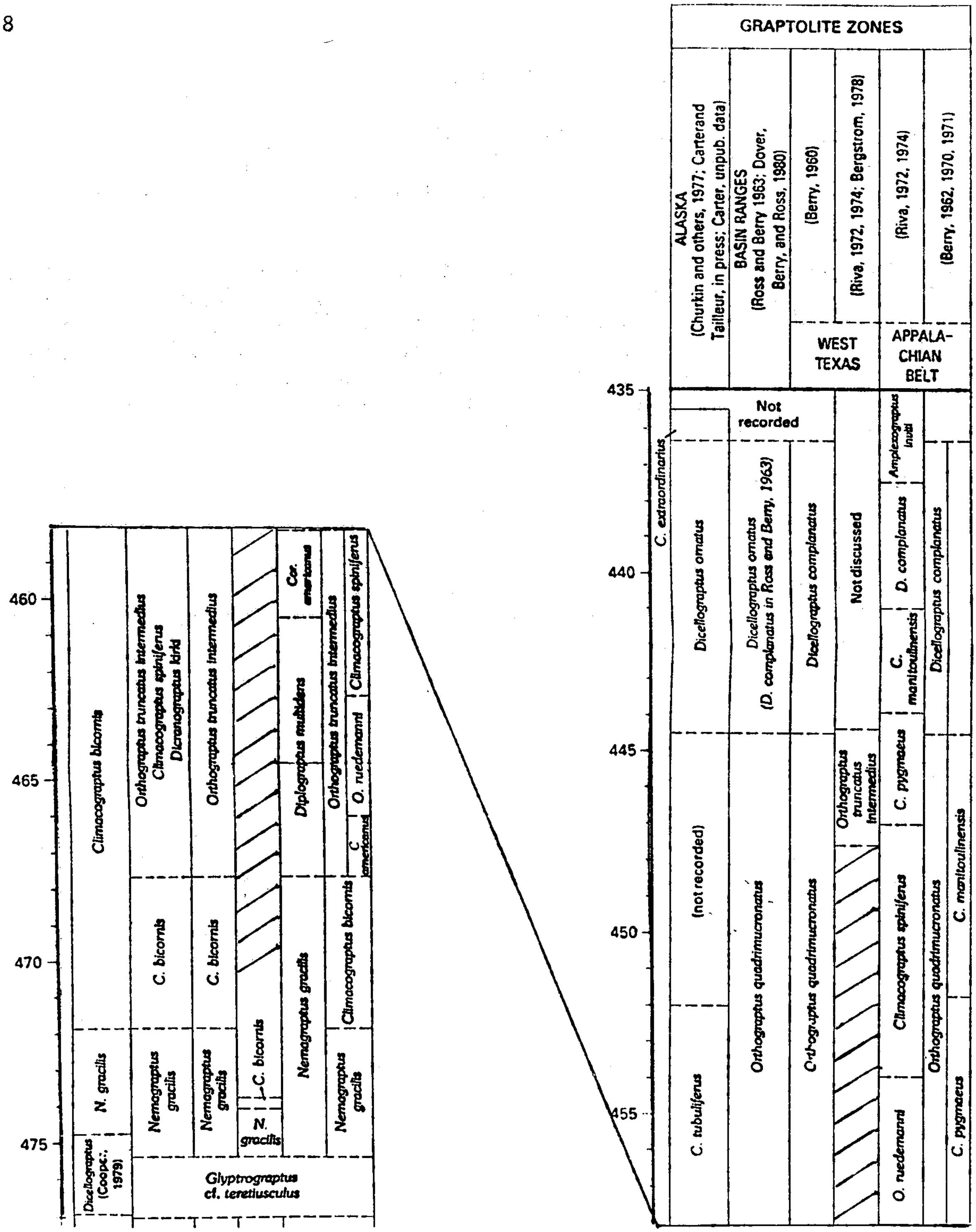
GRAPTOLITE ZONES
ALASKA (Churkin and others, 1977; Carter and Tailleur, in press; Carter, unpub. data)
BASIN RANGES (Ross and Berry 1963; Dover, Berry, and Ross, 1980)
WEST TEXAS (Berry, 1960) (Riva, 1972, 1974; Bergstrom, 1978)
APPALACHIAN BELT (Riva, 1972, 1974) (Berry, 1962, 1970, 1971)
435
440
445
450
455
460
465
470
475
C. extraordinarius
Dicellograptus ornatus
(not recorded)
C. tubuliferus
Not recorded
Dicellograptus ornatus (D. complanatus in Ross and Berry, 1963)
Orthograptus quadrimucronatus
Dicellograptus complanatus
Orthograptus quadrimucronatus
Not discussed
Orthograptus truncatus intermedius
Amplexograptus inuiti
D. complanatus
C. manitoulinensis
C. pygmaeus
Climacograptus spiniferus
O. ruedemanni
Dicellograptus complanatus
Orthograptus quadrimucronatus
C. manitoulinensis
C. pygmaeus
Climacograptus bicornis
N. gracilis
Dicellograptus (Cooper, 1979)
Orthograptus truncatus intermedius
Climacograptus spiniferus
Dicranograptus kirki
C. bicornis
Nemagraptus gracilis
Orthograptus truncatus intermedius
C. bicornis
Nemagraptus gracilis
C. bicornis
N. gracilis
Cor. americanus
Diplograptus multidens
Nemagraptus gracilis
Orthograptus truncatus intermedius
Climacograptus spiniferus
O. ruedemanni
C. americanus
Climacograptus bicornis
Nemagraptus gracilis
Glyptograptus cf. teretiusculus

Figure 3. Middle and Upper Ordovician graptolite zones of North America. Extract from correlation chart in *The Ordovician System in the United States*, International Union of Geological Sciences Publication 12 (1982). Cross-hatched portion is a missing interval according to Riva (1972, 1974) and Bergstrom (1978).

Table 1. Graptolite Taxa Summary

Taxa	NJSM Numbers
Didymograptus sagitticaulis Gurley	12737, 12738
Didymograptus sp.	12240a, 12904, 13531
Dicellograptus sp.	12241a, 12514a, 12552, 13544
Dicranograptus ramosus Hall	12514b, 12536, 12551, 12916
Dicranograptus cf. *kirki* Ruedemann	12243
Dicranograptus sp.	12906, 12908, 12911, 12736
Glossograptus ciliatus Emmons	13471
Climacograptus sp.	12240b, 12245, 12247, 12548–12550 12902, 12910, 12913, 12915, 12735 12740, 12742
Pseudoclimacograptus sp.	12241b, 12543

Acknowledgements

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